

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
16 December 2004 (16.12.2004)

PCT

(10) International Publication Number
WO 2004/109775 A2

(51) International Patent Classification⁷: **H01L 21/00**

(21) International Application Number:
PCT/US2004/016481

(22) International Filing Date: 25 May 2004 (25.05.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/475,552 3 June 2003 (03.06.2003) US

(71) Applicant (for all designated States except US): **THE RESEARCH FOUNDATION OF STATE UNIVERSITY OF NEW YORK [US/US]**; 6th floor, 35 State Street, Albany, NY 12207 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **SHAHEDIPOUR-SANDVIK, Fatemeh [IR/US]**; 8 Monroe Court, Guilderland, NY 12084 (US). **WU, Di [CN/US]**; 1197 Hillside Ave., Apt. B36, Niskayuna, NY 12309 (US).

(74) Agent: **ROTHENBERG, Jeff**; Heslin Rothenberg Farley & Mesiti P.C., 5 Columbia Circle, Albany, NY 12203 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

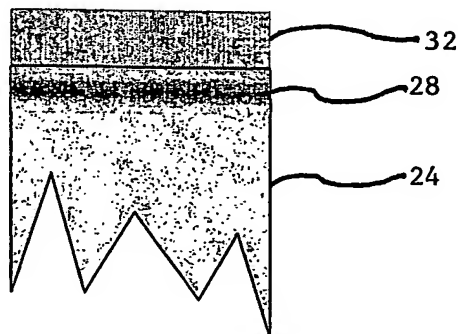
(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— without international search report and to be republished upon receipt of that report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: **FORMATION OF HIGHLY DISLOCATION FREE COMPOUND SEMICONDUCTOR ON A LATTICE MISMATCHED SUBSTRATE**



(57) Abstract: A highly dislocation free compound semiconductor, e.g. $\text{Al}_x\text{In}_y\text{Ga}_{1-x-y}\text{N}$ ($0 < x, y < 1$), is formed on a lattice mismatched substrate, 24 e.g. Si, by first depositing a polycrystalline buffer layer 22 on the substrate. An amorphous layer 28 is then created at the interface of the substrate and the polycrystalline buffer layer, e.g. through ion implantation. A monocrystalline template layer 30 of the compound semiconductor is then deposited on the buffer layer, and an epilayer 32 of the compound semiconductor is grown on the template layer. A compound semiconductor based device structure may be formed in the epilayer.